#### **LIMITED WARRANTY**

TEKIN ELECTRONICS, INC. guarantees this speed control to be free from factory defects in materials and workmanship for a period of 120 days from date of purchase, verified by sales receipt. This warranty does not cover: suitability for specific application, components worn by use, application of reverse or improper voltage, tampering, misuse, or shipping. Our warranty liability shall be limited to repairing the unit to our original specifications. Because we have no control over the installation or use of this product, in no case shall our liability exceed the original cost of the product.

Additionally, these items void the warranty:

- 1. Using the same polarity connectors on the battery and motor wires from the Speed Control.
- 2. Allowing water or moisture into the unit.
- 3. Incorrect wiring.
- 4. Not using the heatsink.
- 5. Use inconsistent with the instructions.

By using this Speed Control, the user accepts all resulting liability.

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Made in the U.S.A.

# OWNER'S MANUAL





GoldFET II Speed Controls with QuickTune™







PRO HIGH-POWER FORWARD/REVERSE



- QuickTune Electronic Tuning gives precise setup in seconds.
- High Frequency Motordrive makes your motor's commutator last 2 to 5 times longer, and extends runtime by 15-25%.
- Regenerative Battery Charging charges your batteries when brakes are applied.
- Uses Tekin's Universal Radio Connector System.
- Equipped with Ultimate GoldFET II Transistors.

INTRODUCTION

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LIMITED WARRANTY .....

The Tekin reversing speed controls are some of the most advanced reversing electronic speed controls ever. This manual covers forward only model Command 10, and reverse models REBEL and TITAN.

Most racing organizations don't allow drivers to operate in reverse. For this reason, the reverse models incorporate an exclusive Reverse Bypass. You can disable reverse by adjusting the time delay to the maximum setting. This allows you to use the REBEL or TITAN speed control in any sanctioned racing events if desired.

TSC Model:	On Resistance:	Input Power:
Command 10	.003 Ohm	4-10 Cells
REBEL	.006 Ohm	4-10 Cells
TITAN	.00187 Ohm	6-10 Cells

#### UNIQUE FEATURES:

COMMAND 10

Solid State Protection against Reverse Voltage Race Quality Performance and Power Handling New High Performance Case Style

#### REBEL

A djustable Reverse-Delay timer with Bypass New Thermal Transfer Technology Extends Power Handling New High Performance Case Style

#### TITAN

External Wire Connection Posts Adjustable Reverse Delay Timer and Bypass Super High Power GoldFET Transistors Powers Dual Motors (16+ Turns)

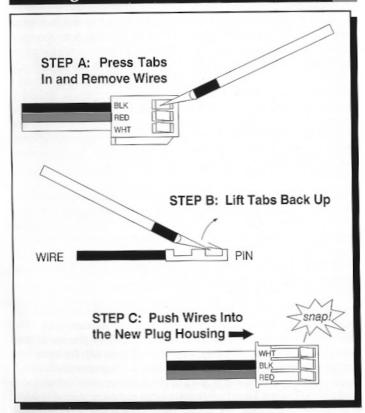
# **Step 1 - CONNECTOR SELECTION**

The first step to preparing your speed control for installation is to ensure that it's compatible with the type of radio receiver you are using. This speed control features the Tekin Universal Radio Connector System. You can use it with TEKIN, Airtronics/Sanwa, Futaba J, JR, KO Propo, and Kyosho Pulsar R/C receivers. The standard connector on this unit is the Tekin/Futaba J. This plug is used on all newer Futaba radio systems. If your receiver is a TEKIN or a newer Futaba, then the standard plug will fit without modification.

When using this speed control with Airtronics, JR, KO Propo, or Kyosho receivers, follow the steps below:

- Remove the original plug housing. Using a small hobby knife or jeweler's screwdriver, press in the three metal tabs only far enough that each of the wires can be removed from the black plastic plug housing. (see page 5, step A)
- 2) After removing the wires from the receiver plug, use a hobby knife or jeweler's screwdriver to lift the metal tabs on each of the wires back up. (see page 5, step B)
- 3) Select the plug housing that matches your radio system and insert the wires into the housing. NOTE: Kyosho Receivers use the "JR" plug housing. Make sure that you put the wires in according to the lettering on the plastic housing. The red wire goes into the space marked "RED", the black wire goes into "BLK", and the white wire goes into "WHT" (see page 5, step C). Wires will snap into place when inserted into the plug housing correctly.

# Figure 1 - CHANGING PLUG TYPES



IMPORTANT: As long as the instructions are followed correctly, and proper polarity is observed, changing the reciever plug will not void the warranty. Wiring the plug incorrectly can damage the speed control or radio receiver, and will void the warranty.

Placement: When choosing a location for the speed control, look for an area that is protected from debris, and is as far away from the radio receiver as possible to prevent radio interference. The mounting location you choose should also allow you to connect the wires to the motor and battery pack without modification. The size of the TITAN may require it be mounted to the shock tower in some off-road applications. It's best to mount the speed control so the fins on the heatsinks are straight up and down for maximum cooling. Where necessary, mount the speed control so the fins on the heatsinks are horizontal. This will also provide sufficient airflow for cooling. The cooler the speed control runs, the more power it can handle without a temporary thermal shut down.

Mounting: Before mounting, clean the bottom of the speed control and the chassis with a mild solvent. Mount the speed control using the provided double-sided tape. DO NOT USE SUPER GLUE or any other type of glue as damage may result. Avoid touching areas where the tape goes, as the oil from your fingers may cause poor adhesion. First, place the double-sided tape on the bottom of the speed control, then stick the unit to the chassis by pressing down firmly.

Heatsinks (TITAN Only): Before mounting the TITAN in your vehicle, you must install the gold-colored heatsinks from the accessory kit. The heatsinks mount over the speed control's MOSFETs (the metal tabs protruding from the plastic case). Align the heatsinks with the metal tabs and press all the way down (see photo on page 11 for proper positioning). There should be a reasonable amount of resistance when installing the heatsinks to prevent them from coming loose during operation. If the fit is too loose, remove the heat sink(s), bend the end fins of the heat sink slightly inward, and re-install. Do not use any glue to hold the heatsinks in place. Once in place, the heatsinks MUST NOT touch each other.

IMPORTANT: To maintain maximum possible performance, models REBEL and TITAN do not have reverse voltage protection. If you plan to change the factory installed battery connector, take all precautions to avoid accidentally connecting the battery to the speed control backwards. Connecting a battery backwards can damage the speed control and/or the battery pack, and will void the warranty.

The Command 10 and REBEL have factory installed Tamiya style (JST) battery connectors and bullet-style motor connectors. The bulletstyle connectors will fit most motors included with R/C kits. If the connectors are not suitable for your application, remove them from the speed control and install an appropriate connectors. Your dealer should have suitable connectors in stock. You can use hard-wired (direct soldered connections) on the motor and battery if desired for improved performance.

Before plugging a battery pack into the speed control make sure the red and black wires on the speed control line up with the red and black wires on the battery pack. In the event your battery pack does not have a suitable connector, you will have to install a new connector.

WARNING: Connecting the battery backwards will void the warranty (except on model Command 10).

CAUTION: If the battery wires touch during plug installation, it will cause an electrical short circuit resulting in damage to the pack and possibly a fire hazard. See your dealer if you need assistance.

#### ... HOOKUP

COMMAND 10					
TSC Black Wire	Battery Negative (-)				
TSC Red Wire 1	Battery Positive (+)				
TSC Red Wire 2	Motor Positive (+)				
TSC Blue Wire .					
l-	REBEL and TITAN				
TSC Black Wire	Battery Negative (-)				
TSC Red Wire					
TSC Pink Wire	Motor Positive (+)				
TSC Blue Wire	Motor Negative (-)				

**Note:** There are usually small "+" and "-" marks on the motor to indicate positive and negative for proper hookup.

When routing the speed control's wires for the motor and battery pack, be sure to secure them in place and at a safe distance from all moving parts with the included zip-ties. This will keep the wires in good condition and prevent them from coming near the receiver or the antenna, preventing potential interference.

A final step to connecting your speed control is to plug the receiver harness into the radio receiver. This speed control includes a BEC (Battery Eliminator Circuit) that eliminates the need for a separate receiver battery pack in most cases. Plug the speed control's harness into channel two (throttle) of your radio receiver and the wiring is complete.

# CAPACITOR INSTALLATION . . .

A minimum of two (2) 0.1uF capacitors should be attached to the driving motor to prevent radio interference. Some after-market motors may already have 2 or 3 capacitors installed, which would be adequate. If the motor you plan to use does not have capacitors, you must install them.

It is easiest to install the two.1uF capacitors next to each other on one side of the endbell. There is no polarity on 0.1 uF capacitors, either wire can go to positive (+) or negative (-). Take a capacitor and solder one of its leads to the positive tab of the motor. Solder a lead from the other capacitor to the negative tab of the motor. Solder the remaining lead from both capacitors to a ground. On a stock class motor, solder the capacitors directly to the can of the motor. Modified class motors have a third tab held in place by the motor endbell screw. Solder the remaining capacitor leads to the tabs.

NOTE: It's best to cut the leads of the capacitors as short as possible, while still allowing proper installation. The shorter leads will keep the capacitors in closer to the motor and reduce the chance for damage from flying debris.

A closed endbell, or Mabuchi motor has only two tabs, one positive and one negative. This requires the capacitors be installed on opposite sides of the motor using the same procedure as the stock class motor. Solder one lead of each capacitor to the positive and negative tabs of the motor. Solder the remaining leads to the can of the motor.

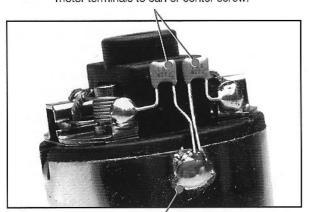
You can install an optional third capacitor as a backup in case one of the two main capacitors becomes damaged or is bad. Attach the third capacitor to both the positive and negative tabs of the motor. Solder one lead of the capacitor to the negative tab of the motor, and the other lead to the positive tab. On an open-endbell motor, install the third capacitor on the opposite side of the endbell from the first two capacitors.

NOTE: For best results when soldering capacitors directly to the motor can, you can scrape or lightly file any plating or paint from the can. Doing so will make solder application much easier.

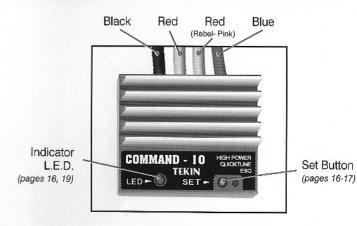
**CAUTION:** Do not use 47 uF polarized capacitors with REBEL or TITAN. These types of capacitors will explode if used with a reversing speed control.

**CAUTION:** Do not use a Schottky motor diode with REBEL or TITAN. Using a motor diode with a reversing speed control can damage the speed control, and will void the warranty. A Schottky motor diode MAY be used with the Command 10, as it does not have a diode built in.

.1 uf Capacitors (2) - Solder as shown from motor terminals to can or center screw.



Scrape away paint or finish before soldering to the motor can.



Large Heatsinks (page 6)

Set Button (pages 16-17)

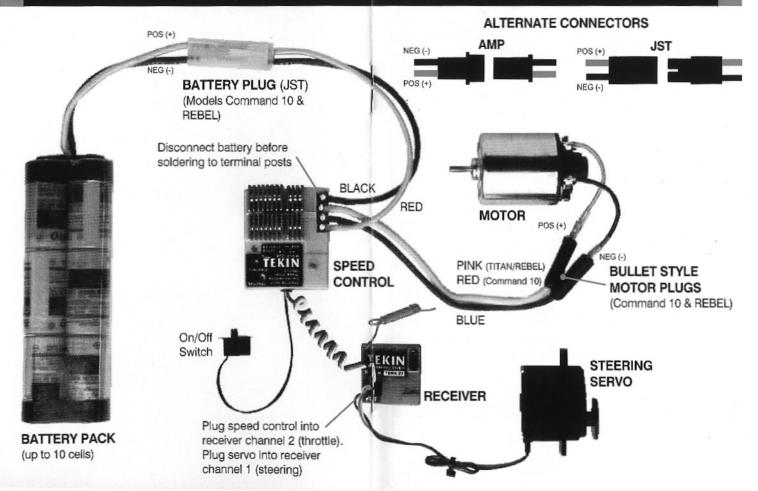


Small Heatsinks

Black Pink

Blue Red (page 8)

Indicator L.E.D. (pages 16, 19)



The Transmitter Adjustment Chart on the following page lists most popular radio systems. The chart outlines some of the radio's features, that if not properly adjusted, may affect proper operation of the speed control.

Find your radio system on the chart (listed by manufacturer and type) and adjust accordingly.

Most any transmitter adjustment will work with this speed control, as they have electronic tuning. Although you can set transmitter's NOR/REV switch in either direction, we do recommend setting it as shown in the chart. The setting in the chart will cause the brakes to come on if you drive the car out of the transmitter's range. Otherwise, the car could take off at full speed if driven to far away from the transmitter.

*Unlisted Transmitters:* If you don't find your transmitter listed in the chart, generally, set the END-POINT adjustments between midway and maximum.

# TRANSMITTER ADJUSTMENT CHART

TX TYPE	* THR EXPO	ATL	ATV o	r EPA LOW	THR TRIM	SUB TRIM	REV SW	MECH ADJ	COAST BRAKE
FUTABA									
FP-T2PKA FP-3PG FP-T2P FP-T2PB FP-T2PD FP-T2PBKA FP-T2NCS FP-T2NBR PCM 1024	 0      4	5 10	5 10  5 10  5	6 6 10 5	5 5 5 Low 5 Low 5 Down Down N	0	Right NOR Rev. Rev. Rev. Rev. Rev. Rev. Rev.	Pos. 2 Pos. 2 1/2 Left 1/2 Left  Up 1/3	ATV Low Brake Trim None None ATL ATV Low Pot None None Throttle Trim
AIRTI	RONIC	CS/	SAN	NA					
3P-FM XL-2P CS-2P VT-2P	 NOR 		140% Max. CW	CCW Max. CW	CW Mid. Mid. Low	1111	NOR NOR NOR Left	   Down	Throttle Trim Throttle Trim Throttle Trim None
JR PR	OPPO	)							
ALPINA-2 PCM R756	- 0	-	10  H100	10  B100	Mid. CCW Up	0	NOR NOR Left	1:1	Throttle Trim None Trim Tab, Knob
КО Р	ROPP	O							
EX-1 EX-1 FM EX-II EX-5 EX-7 EX-9	Min. Min.   Min.	-	Max. CW Max. Max.  Max.	    Max.	Mid. B Mid. Mid. CCW Mid.		Left Dowm Up Right Down Left	  Pos. B	CH 2 Trim Brake Dial Brake Trim Brake Trim None CH 2 Trim
KYOS	KYOSHO / PULSAR								
PRO 2001	-		Н	L	Up		NOR	1/2	EPA Low

CCW = Counter Clockwise CW = Clockwise

<sup>\*</sup> Adjust Throttle Exponential control for best balance of low speed and high speed driving power.

Before you get started: We recommend that you remove the pinion gear from the motor, or to make sure the vehicle is held securely on a stand with its tires off the ground to prevent movement of the vehicle during adjustment. Also make sure the transmitter batteries are charged.

#### Transmitter Matching:

This speed control uses QuickTune to simplify much of the setup procedure and to provide accurate calibration.

- Turn on the transmitter, then the speed control, and leave the transmitter in the neutral position.
- Press and hold the speed control's **SET** button for **10 seconds** until the red light starts blinking. 1) Pull full throttle on the transmitter. 2) Push to full brake. 3) Release the trigger. You must complete these three steps while the light continues to blink (about 5 seconds). When the light stops blinking, the calibration is complete.

Note: When properly calibrated, the Green LED comes on at full throttle, the Red LED is bright at neutral, and is variable for brake/reverse. If the motor runs in reverse when you apply throttle at the transmitter, you have the motor (+) and (-) wires hooked up backward. Full speed forward should occur when the Green LED is on, or the reverse delay will operate backwards.

Adjust the brakes if desired using the brake trim or EPA/ATL/ATV low adjustment on the transmitter. Whenever you re-set the speed control, be sure to first put the transmitter brake trim or EPA/ATL/ ATV back to maximum. Note: If you do not apply brakes during the QuickTune procedure, the brakes will be disabled.

# ... SPEED CONTROL ADJUSTMENT

Setting the Reverse Delay:

The reverse delay allows the brakes to come on for a while before the reverse kicks in, for more driving control. The delay can be set from about 0 to 4 seconds, or bypass (no reverse at all, just brakes).

After completing the QuickTune Transmitter Matching procedure on the previous page, press the SET button again and hold it for the length of time you want the reverse delay to be. If you hold the button for more than 4 seconds, reverse operation will be disabled and the REBEL will only have forward/brake until you set the reverse delay again.

Note: Holding the button too long (about 10 seconds) will initiate Radio Calibrate Mode. If this occurs, you will have to repeat the QuickTune Transmitter Matching procedure. (See previous page.)

#### SET-BUTTON FUNCTION:

Holding in for:	Does This:
0 to 4 seconds	Sets reverse delay time (TITAN & REBEL)
5 to 9 seconds	Activates reverse bypass (тітам & REBEL)
	QuickTune radio calibrate mode

# **OPERATING TIPS...**

Listed below are a number of tips to ensure that you will get years of trouble-free service from your Tekin electronic speed control. By following these simple tips, you can prevent unnecessary damage and erratic operation.

- Proper on/off procedure: The first step to preparing your R/C vehicle for operation is to turn on your transmitter. Next, turn on the switch for the speed control. It is recommended that you have a good hold on the vehicle or to hold it up off the ground when turning on the speed control switch. This will prevent the vehicle from taking off in the event the transmitter's adjustment knobs were accidentally moved during storage. At the conclusion of your run, simply reverse the above procedure. Turn off the speed control first, then turn off your transmitter.
- 2) Recommended motors: We do not recommend using a modified motor with fewer than 11 turns of wire on the armature (modified class motors will usually have the number of turns marked on the package when you buy them). Using a motor with fewer than 11 turns of wire ( will will result in accelerated heat build-up in the speed control without a substantial increase in performance. Heat will cause the speed control to slow down or shut off, until it cools down some. Also do not use a motor pinion gear that is too large for the application, especially with modified motors. Modified motors operate at very high RPM which requires a smaller pinion gear. A suitable pinion gear should provide four or more minutes of run time under racing conditions.

# ... OPERATING TIPS ...

- 3) Full Speed Indicator: On the reverse models (REBEL and TITAN), the indicator lights will glow GREEN when the speed control is running FULL FORWARD. If the light is green when the motor is running backward, then the motor wires are connected to the speed control backward and should be switched.
- 4) Twin motors: When using the TITAN in applications with two motors, such as monster trucks, we recommend using 7-cells or less andmotors with 12 or more turns. Two motors draw a tremendous amount of current and can overheat the speed control when operating with more than 7-cells. The Command 10 and REBEL are for single motor use only.
- 5) Battery polarity: It is extremely important to ensure the battery pack is connected to the speed control properly. If the polarity is accidentally reversed, there could be severe damage to the battery pack and/or speed control. The connectors installed on the REBEL are polarity protected, which means they can not be connected backwards. If you plan to change to a different type of connector, be sure it is polarity protected. Refer to pages 7 and 8 of this manual for more information. Applying reverse voltage to the speed control voids the warranty (except Command 10, which has Solid State Protection).
- 6) Do not jam gears: Avoid rapidly switching from forward to reverse. Doing so will cause a tremendous amount of current drain resulting in reduced run time. Operating the speed control in this manner will also cause excessive heat build-up resulting in power loss. By making a smooth transition from throttle to brake, and then into reverse, you take advantage of the speed control's regenerating ability which will extend run time. Wear and tear on the vehicles components will also be reduced by smooth operation.

# ... OPERATING TIPS

7) Radio Interference: If the throttle or steering is erratic or cuts out, when the throttle is applied, you may be getting receiver interference. Try to keep the receiver at least 1-2 inches (25-50 mm) away from any motor or battery wires or battery pack connection "bars". Also try moving the receiver around; ie. in the shock tower, in the front of the car, or turned on either of its sides.

A TEKIN Micro Receiver is highly recommended. It should be mounted on its side. Keep the receiver at least 1/2" away from the batteries and any power wires.

**Note:** If the receiver must be mounted close to the battery or wires, wrap a small piece of aluminum foil around the receiver to provide additional shielding from radio noise.

8) Receiver battery: The built-in BEC (Battery Eliminator Circuit) is strong enough for 1 standard servo (for steering). If you are using a high power servo, or over 8 cells, a separate receiver battery should be used.

# **USING A RECEIVER BATTERY**

To connect a receiver pack you first need to turn the speed control OFF. Then simply plug the battery into the "B" or "BAT" socket on the receiver. A small switch should be used on the receiver pack to operate the radio. Leave the speed control switch turned "OFF", or speed control damage can result and will void the warranty. The receiver pack should have no more than 5 cells and should be charged on a TEKIN 'BC series' digital charger for best results.

# TROUBLESHOOTING ...

#### ERRATIC RADIO OPERATION

- a) No capacitors on motor: Install capacitors (pages 9-10).
- b) Receiver or antenna to close to speed control and/or wires: Move speed control and receiver at least 1/2" apart.
- c) More than 7 cells in main battery: Reduce main pack to 7 cells or use a separate receiver battery pack.
- d) Main battery voltage to low: Recharge main battery pack.

#### NOT REACHING FULL SPEED

Speed control not adjusted properly: (See pages 16-17.)

# OVERHEATING OR SHUTTING DOWN

- a) Main battery connected backwards: Disconnect main battery immediately!
- b) No cool down period between runs: Allow speed control to cool down between runs.
- c) Using a modified motor with fewer than 11 turns: Use a milder motor.
- d) Operating in reverse for extended period of time: Avoid using reverse excessively.
- e) Pinion gear on motor is too big: Use smaller gear (car should run for approximately 3 or more minutes).
- Transmitter and/or speed control not adjusted properly: (Refer to pages 14-17.)
- g) Heatsinks needed: Install heatsinks per instructions (Page 6).
- h) More airflow needed for cooling: Change location of speed control.
- i) Binding in motor or drivetrain: Ensure drivetrain is operating smoothly.

# MOTOR WON'T SHUT OFF; RUNS AT LOW SPEED

Moisture in speed control: Disconnect battery and allow speed control to dry.

#### **REPAIRS & SERVICE**

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# THROTTLE WORKS, STEERING DEAD

- a) Bad servo and/or wiring: Replace steering servo and/or wiring.
- b) Servo not plugged into receiver channel 1 (steering): Plug servo into channel 1 of receiver.

# STEERING WORKS, THROTTLE DEAD

- a) Speed control receiver plug improperly wired or not plugged into receiver channel 2 (throttle): (See pages 4-5 and 7-8.)
- b) Faulty motor and/or wiring: Check condition of motor and related connections.
- c) Transmitter and/or speed control not adjusted properly: (Refer to pages 14-17.)

#### STEERING AND THROTTLE DEAD

- a) Speed control receiver plug improperly wired or not plugged into receiver channel 2 (throttle): (See pages 4-5 and 8-9.)
- b) Battery voltage too low: Recharge battery.
- c) Faulty battery and/or wiring: Check condition of battery and related connections.
- d) Dirty on/off switch: Clean switch or return to factory for repair.
- e) Faulty radio equipment: Check radio batteries and crystals. Consult radio owner's manual.
- Internal speed control damage: Return speed control to factory for repair. (See page 23.)

# REVERSE NOT WORKING (TITAN & REBEL ONLY) Reverse disabled: Readjust reverse delay. (Refer to page 17.)

# DELAY BEFORE FORWARD THROTTLE ACTIVATES

Transmitter and/or speed control not adjusted properly: Adjust speed control and/or transmitter. (Refer to pages 14 - 17.)

This electronic speed control is the most advanced unit available and we believe also the most reliable. As long as it is not abused it will give years of frequent service. In the rare event you do have a problem, fill out the Service Return Card that is included with your unit, or write a detailed explanation and proceed as follows.

**WARRANTY:** Hobby dealers and distributors are not authorized to replace units thought to be defective. Repairs must be returned directly to the factory. A sales receipt must be enclosed. If unit is working properly and you just want it checked over there will be a small inspection charge.

NON WARRANTY: Repairs may be sent directly to the factory. We are not responsible for independent service stations. No estimate is provided. Customer assumes responsibility for charges, which will never exceed 50% of the list price of the unit. Repairs are returned via UPS COD CASH or billed to a Credit Card. All addresses outside the US require a credit card. You must enclose a filled return card stating the problem, a legible return address and any special shipping instructions. We cannot return units to a P.O. Box unless payment is sent with the TSC. Hobby Dealers will not replace units thought to be defective, these units must be returned directly to TEKIN ELECTRONICS, INC. for repair. Repair prices are as follows: Flat rate labor \$8.00, Replace wires \$4.00, Replace switch \$5.00, Replace plug \$5.00, Repair brakes \$6.00, COD \$4.50, 2-Day return shipping \$6.00, Next day return shipping \$15.00, Handling \$3.00. Most repairs are shipped back out within 3 working days. Please allow sufficient delivery time (up to 2 weeks). Rates subject to change. Sorry, we do not repair non-TEKIN items.

SHIP REPAIRS TO:

Tekin, Inc. McCall, Idaho (208) 634-5559 www.teamtekin.com